

reactive materials and molecular sieves.--

REMARKS

Claims 36, 37, 40-42, 44-56 are pending in this application. No Excess Claims Fee is believed due in connection with claims 46-57 added above.

As to the amendment to Claims 36, 37 and 40 to recite a thermoplastic component, see Applicant's original claim 39. See also Applicants' specification, e.g., at page 4, ~lines 15 and 26-29; page 10, ~lines 9-10. Claim 39 has been canceled above without prejudice or disclaimer, its subject matter being recited in the independent claims.

As to new dependent claims 46-56 added above, see, e.g., Applicants' original claims 8-19.

At pages 2-3 of the Office Action, Claims 44-45 have been objected to. The Examiner states that these claims "should be reconsidered since the Applicant elected the species of carbon fiber, as opposed to the species of polyacrylonitrile or pitched based carbon." (Office Action, page 3.) Applicant responds that the Examiner's objection appears to be misguided, because these claims in fact further limit the type of carbon fiber used, to polyacrylonitrile or pitch based carbon.

At page 3 of the Office Action, Claims 36-37, 39-40, 42 and 44-45 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Bagg (4,016,031) in view of Fukuta (4,229,397).¹

Applicants respectfully traverse the obviousness rejection based on Bagg combined with Fukuta. No single reference (Bagg or Fukuta) discloses all of the recitations of Applicant's present claims, or how to make a mat or product according to Applicant's presently claimed invention.

Each of Applicants' base claims 36, 37 and 40 as amended above recite "a plurality of discontinuous reinforcement fibers" and "a thermoplastic component".

¹ The Examiner cites col. 1, lines 50-55 and col. 3, lines 5-50 of Bagg. The Examiner admits that Bagg fails to disclose a basis weight of the mat. However, the Examiner cites Fukuta (col. 1, line 35 to col. 2, line 41, and col. 4, lines 46-50) and asserts that it would have been obvious, to one skilled in the art at the time the invention was made, to combine the teachings of Bagg and Fukuta, because, in the Examiner's view, such a combination would provide a mat of a wide range of basis weights in the design of Bagg.

In Applicant's claimed invention, the thermoplastic component is "polyethylene, polypropylene, polyethylene terephthalate (PET), polyamides, polyethylene naphthalate (PEN), polyetheretherketone (PEEK) or polyetherketoneketone (PEKK)." In Applicant's presently claimed invention, "concentration of reinforcement fiber components to thermoplastic components is in a range of 60-70% by weight of reinforcement fibers to 40-30% by weight of thermoplastic components." The discontinuous fibers are highly oriented in Applicant's inventive mat, expressed as their having "at least a 9 to 1 machine to cross direction mat strength ratio" (Claim 36), or, "at least a 90% machining direction orientation" (Claim 37). A mat or product containing a thermoplastic component (as recited in Applicants' amended claims 36, 37 and 40) can be melted and stabilized in an in-line convection oven. (See Applicant's specification at page 7, lines 16-17, identifying this feature associated with the presence of a thermoplastic component.)

In addition to the deficiency in Bagg that the Examiner already has recognized, the primary Bagg reference does not teach or disclose the thermoplastic component.

Also, Bagg does not disclose the basis weight of his mats. Applicant's claims recite the basis weight as 68 to 339 gm/square meter which is 2 to 10 oz./square yard, 42 to 208 pounds per 3000 square foot ream, 0.014 to 0.069 pounds/square foot.²

Representative mats of the presently claimed invention are relatively more useful in high speed and/or automated production or reproducible structural parts and shapes³ than the mats of Bagg's examples. Representative mats of the presently claimed invention can provide unexpectedly superior stiffness, reduced weight, strength, and/or engineered properties (physical, mass transfer, heat transfer, and electrical)⁴ compared to Bagg's mats. In many applications, the

²See Applicants' specification at page 7, lines 22-24 for the unit conversion.

³See Applicants' specification at page 10, lines 16-17.

⁴Id., lines 17-19.

weight savings translate to significant energy savings.⁵ The presence of the thermoplastic component in Applicants' inventive mats means that thermal or adhesive bonding may be accomplished. When thermally or adhesively bonded, the inventive mats may be made into high modulus, light weight, structural composites suitable for, but not limited to, automotive frames, other lightweight transportation (trucks, buses, trains, airplanes), infrastructure (commercial and home construction, column reinforcement, acoustical materials), electronics (EMI, RFI shielding, cases, circuit boards, high strength insulators or conductors, heat sinks), membrane or filter reinforcements, consumer products (sporting goods, furniture frames, shoe parts, loudspeaker "horns", etc.), and many other applications in which stiffness and light weight are specified.⁶

Bagg's Example 1 uses a "chopped carbon fibre"⁷ to give "a layer of carbon fibre felt"⁸ which was impregnated with epoxy resin⁹ before moulding at high pressure. The thermoplastic component-containing mats of Applicant's presently claimed invention provide unexpectedly superior results compared to Bagg's representative thermoplastic component-lacking mat of his Example 1. Bagg's mats (such as Bagg's Example 1 mat) cannot provide the superior stiffness, reduced weight, strength, and/or engineered properties (physical, mass transfer, heat transfer, and electrical) that Applicant's inventive thermoplastic component-containing mats can provide. Bagg's mats (such as Bagg's Example 1 mat) cannot be subjected to thermal or adhesive bonding as can Applicant's inventive mats.

Nor does the secondary reference, Fukuta, supply what is missing from Bagg. Fukuta does not teach or disclose how to obtain 90% orientation and the desired basis weight 68 to 339 grams/square meter recited in Applicant's claims and use the advantageous thermoplastic component, and to use concentration of

⁵Id., lines 19-20.

⁶Id., lines 21-30.

⁷Bagg, col. 4, line 48.

⁸Bagg, id., lines 56-57.

⁹Bagg., id., line 63.

reinforcement fiber components to thermoplastic components in a range of 60-70% by weight of reinforcement fibers to 40-30% by weight of thermoplastic components. When Fukuta uses glass fibers with polypropylene fibers, he uses 40% glass (reinforcing) fibers and 60% polypropylene (thermoplastic) fibers. (Fukuta Example 6, col. 8.) Fukuta is making a different product than Applicant's presently claimed mats.

Even with Bagg and Fukuta, a person of ordinary skill in the art would not be motivated to modify Bagg in the direction of the presently claimed invention. Fukuta is evidence that when a person of ordinary skill in the art adds use of the thermoplastic component, he still does not make Applicant's presently claimed inventive mat.

Wherefore, reconsideration and withdrawal of the obviousness rejection based on Bagg combined with Fukuta are respectfully requested.

At page 4 of the Office Action, dependent Claim 41 has been rejected under 35 U.S.C. 102(b) as anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over, Bagg.

Applicant respectfully traverse the rejection of dependent Claim 41, and incorporates by reference the above remarks. Wherefore, reconsideration and withdrawal of the art rejection of Claim 41 based on Bagg are respectfully requested.

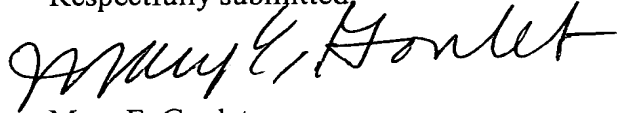
At page 4 of the Office Action, Claim 41 has been rejected under 35 U.S.C. 102(b) as anticipated by, or, in the alternative, under 35 U.S.C. 103(a) as obvious over, Fukuta.

Applicant respectfully traverses this rejection of Claim 41. Fukuta does not disclose or suggest a wetlay orientation of 90% (i.e., a 9:1 MD/CD orientation). Applicant's product of claim 41 comprising a plurality of mats having 9:1 MD/CD orientation are different from all products of Fukuta. Wherefore, reconsideration and withdrawal of the art rejection of Claim 41 based on Fukuta are respectfully requested.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 36, 37, 40-42, 44-56 be allowed, and that the application be passed to issue. Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at

the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview. A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041.

Respectfully submitted,



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